Lvalues and rvalues Solutions

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lvalue and rvalue

- Give a definition of lvalue and rvalue
  - In C
    - An lvalue can appear on the left of an equals sign
    - An rvalue can only appear on the right
  - In C++
    - We can take the address of an lvalue using the & operator
    - We cannot take the address of an rvalue
- Give some examples of lvalues and rvalues
  - lvalue - any variable which has a name
  - rvalue - literals, temporary variables, return values from functions

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lvalue reference

- Explain briefly what is meant by "lvalue reference"
  - An lvalue reference is another name for the traditional C++ reference
- Can an lvalue reference be bound to an rvalue?
  - Generally, an lvalue reference must be bound to an lvalue
  - However, a const lvalue reference can be bound to an rvalue

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Rvalue Reference

- Explain briefly what is meant by "rvalue reference"
  - An rvalue reference is a syntactic device
  - It is mainly used for function arguments, to indicate that data must be moved into the argument

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Rvalue Reference

- Write a function which takes an argument by rvalue reference
- Write a program which calls this function and passes it
  - An lvalue
  - An rvalue
- Explain your observations
  - The program does not compile when an lvalue is passed
  - This is because an lvalue cannot be implicitly converted to an rvalue
  - The program compiles and runs when an rvalue is passed

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std::move

- How can we pass an lvalue as an rvalue reference?
  - We can cast the lvalue by calling std::move()
  - This returns its argument as an rvalue
- Is it safe to use a variable after passing it to std::move()?
  - Calling std::move() indicates to the compiler that we do not want to use the data in the variable again
  - After calling std::move(), the variable's data may not be in a usable state
  - However, it is safe to reset the variable by assigning it to some other data
  - The variable can then be used again

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